

Please Stand By



Bacon Intermission In Progress

Testing: It's not just for your code!

...and other heretical proclomations

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Follow along! <http://chrislaco.com/slides/pyten-testing.pdf>



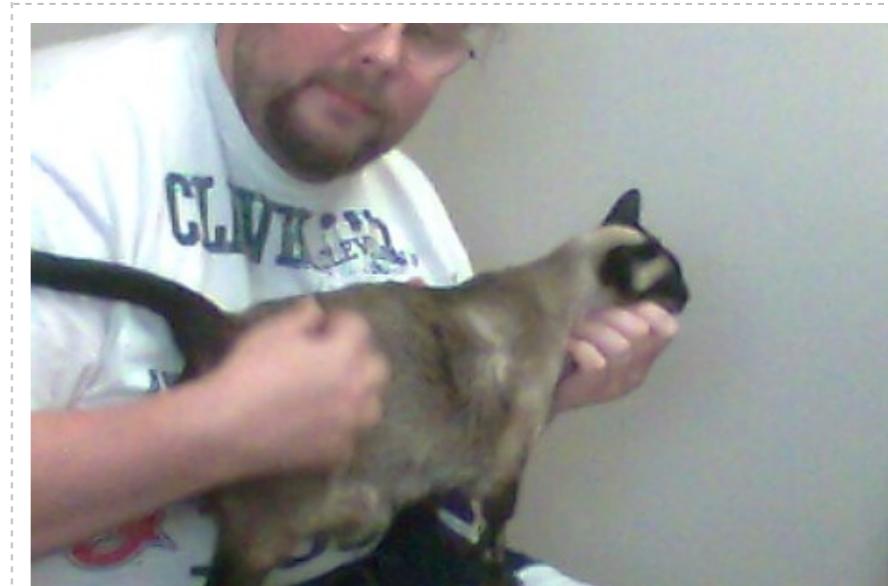
Legal Disclaimer

Ohio Revised Code 314159

Section (c), Subsection (a), Paragraph (t)
states in part:

**“...any person or persons presenting
computer related content to a group
[audience] is required to show at a
minimum of at least one (1) domestic
feline [cat] picture during previously
stated presentation.”**





Playing Cat Banjo





5



Many Playing. Such Cat. Very Banjo.
WOW!



Shout out to our sponsors





And Now On With The Heresy!



We Never Landed On It



He's Not The Real One



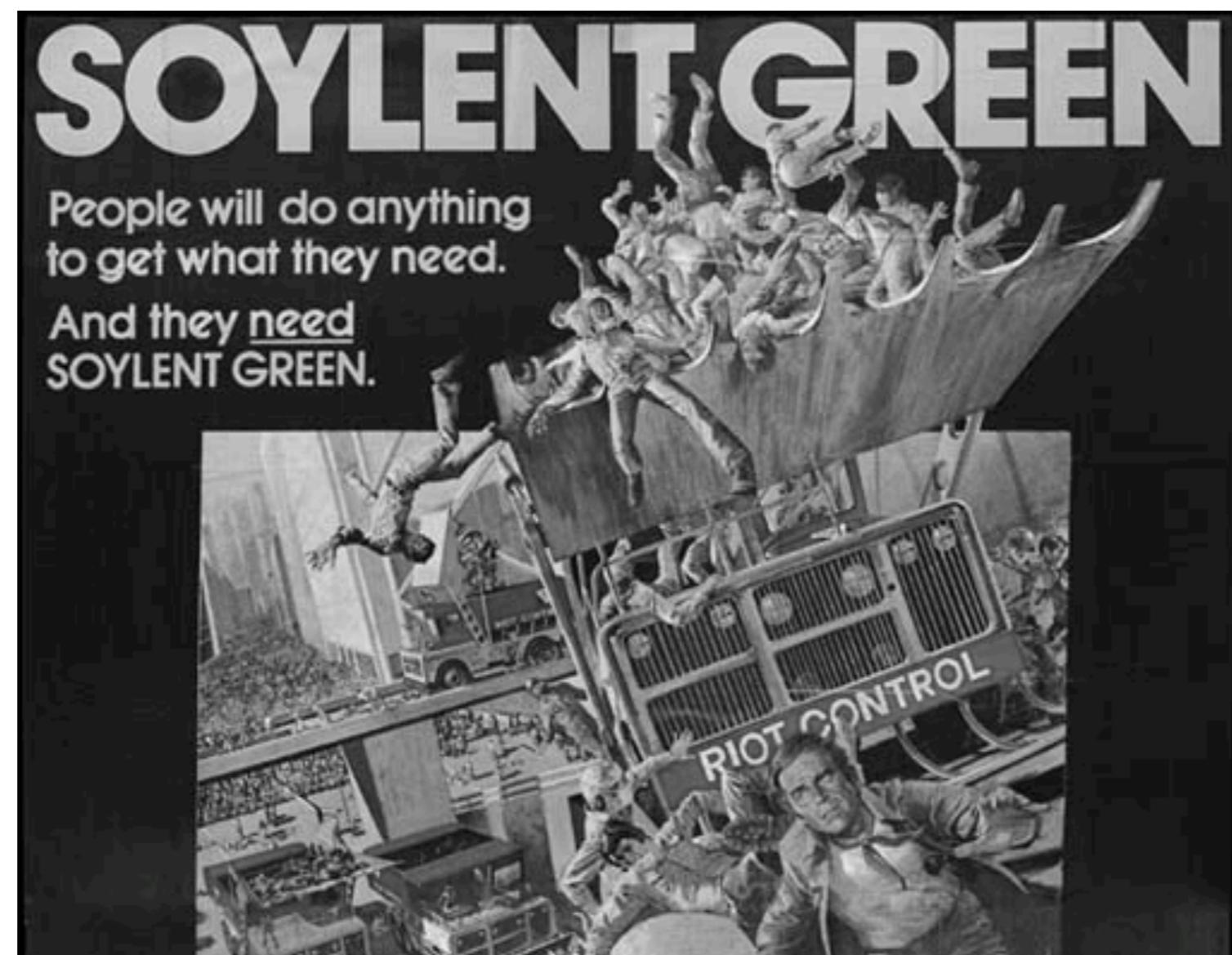
He's Still Alive



He's Still Alive



It's [Bacon] Made Of People



It Is The Documentation



RSpec



They'll Write Them For / With You

Cucumber

behavior
scenario
step
examples
wip
failed
design
setup
passed
outline
given
specify
feature
testing



We're Deploying Images Now



Our Work Here Is Done

Legend: Low: 0% to 35% | Medium: 35% to 70% | High: 70% to 100%

	Coverage							
	Lines		Functions / Methods			Classes		
Total	<div style="width: 100.00%;"> </div>	100.00%	1288 / 1288	<div style="width: 100.00%;"> </div>	100.00%	114 / 114	<div style="width: 100.00%;"> </div>	100.00%
http	<div style="width: 100.00%;"> </div>	100.00%	305 / 305	<div style="width: 100.00%;"> </div>	100.00%	16 / 16	<div style="width: 100.00%;"> </div>	100.00%
template	<div style="width: 100.00%;"> </div>	100.00%	333 / 333	<div style="width: 100.00%;"> </div>	100.00%	16 / 16	<div style="width: 100.00%;"> </div>	100.00%
autoload.php	<div style="width: 100.00%;"> </div>	100.00%	20 / 20	<div style="width: 100.00%;"> </div>	100.00%	3 / 3	<div style="width: 0.00%;"> </div>	
config.php	<div style="width: 100.00%;"> </div>	100.00%	6 / 6	<div style="width: 100.00%;"> </div>	100.00%	4 / 4	<div style="width: 100.00%;"> </div>	100.00%
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crypto.php	<div style="width: 100.00%;"> </div>	100.00%	50 / 50	<div style="width: 100.00%;"> </div>	100.00%	7 / 7	<div style="width: 100.00%;"> </div>	100.00%
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mongrel2.php	<div style="width: 100.00%;"> </div>	100.00%	77 / 77	<div style="width: 100.00%;"> </div>	100.00%	11 / 11	<div style="width: 100.00%;"> </div>	100.00%
template.php	<div style="width: 100.00%;"> </div>	100.00%	90 / 90	<div style="width: 100.00%;"> </div>	100.00%	25 / 25	<div style="width: 100.00%;"> </div>	100.00%
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We Don't Need QA

Legend: Low: 0% to 35% | Medium: 35% to 70% | High: 70% to 100%

	Coverage										
	Lines		Functions / Methods			Classes					
Total	<div style="width: 100.00%;"> </div>	100.00%	<div style="width: 100.00%;"> </div>	1288 / 1288	<div style="width: 100.00%;"> </div>	100.00%	<div style="width: 100.00%;"> </div>	114 / 114	<div style="width: 100.00%;"> </div>	100.00%	33 / 33
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<input type="checkbox"/> config.php	<div style="width: 100.00%;"> </div>	100.00%	<div style="width: 100.00%;"> </div>	6 / 6	<div style="width: 100.00%;"> </div>	100.00%	<div style="width: 100.00%;"> </div>	4 / 4	<div style="width: 100.00%;"> </div>	100.00%	1 / 1
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<input type="checkbox"/> crypto.php	<div style="width: 100.00%;"> </div>	100.00%	<div style="width: 100.00%;"> </div>	50 / 50	<div style="width: 100.00%;"> </div>	100.00%	<div style="width: 100.00%;"> </div>	7 / 7	<div style="width: 100.00%;"> </div>	100.00%	2 / 2
<input type="checkbox"/> http.php	<div style="width: 100.00%;"> </div>	100.00%	<div style="width: 100.00%;"> </div>	113 / 113	<div style="width: 100.00%;"> </div>	100.00%	<div style="width: 100.00%;"> </div>	15 / 15	<div style="width: 100.00%;"> </div>	100.00%	5 / 5
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It's A Hardware Problem

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<input type="checkbox"/> template	<div style="width: 100.00%;"> </div>	100.00%	333 / 333	<div style="width: 100.00%;"> </div>	100.00%	16 / 16	<div style="width: 100.00%;"> </div>	100.00%	5 / 5
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<input type="checkbox"/> translation.php	<div style="width: 100.00%;"> </div>	100.00%	192 / 192	<div style="width: 100.00%;"> </div>	100.00%	9 / 9	<div style="width: 100.00%;"> </div>	100.00%	1 / 1

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Inspiration: It's OK To Like Perl

- ⬢ Perl 5.005/5.6 - 1998/2000 / CPAN - 1995 / Testers - 1999
- ⬢ Python 1.5.2/2.0 - 1999/2000 / PyTest/Nose - 2004/2005 / PyPi - 2003
- ⬢ Ruby 1.8 - 2003 / RSpec - 2005 / GemTesters - 2010
- ⬢ Test code, style, metrics, performance
- ⬢ Tests uploaded across platforms / versions (at install time!)
- ⬢ TAP - Test “Anything” Protocol; Perl, PHP, Ruby, C, etc
- ⬢ Andy Lester (PETDANCE): Test Everything
- ⬢ Great TeamCity Nightmare of 2011



Why are we here?

- ⬢ Heard the word “testing”
- ⬢ Python!
- ⬢ TDD / BDD / Agile / Red Green Refactor
- ⬢ Nose / PyTest / Behave / RSpec / Test::Unit / Cucumber / Other
- ⬢ Rewrite! My Tests Still Pass!
- ⬢ Fast Testing as a process w/ feedback loops
- ⬢ Software Quality / Craftsmanship





“Good News Everyone!”

We're not talking about those!



Say what meow?

- ⬢ Those things are awesome
- ⬢ Developer centric ideas
- ⬢ Focused on process
- ⬢ Forgetting about product
- ⬢ Product lifecycle is bigger than that
- ⬢ Fail doesn't discriminate
- ⬢ Lets talk about the other things



Why do we write tests?

- ⬢ Measure code quality*
- ⬢ Freedom to refactor / prevent regressions
- ⬢ Document software interface
- ⬢ Confirm expectations / requirements
- ⬢ Code style / metrics
- ⬢ Pass on knowledge
- ⬢ Early warning system



Why not other things?

- ⬢ Prevent non-software regressions
- ⬢ Document environment
- ⬢ Confirm data expectations
- ⬢ Tests as an early warning system
- ⬢ Monitor is just a scheduled test
- ⬢ Manage problems that might not be preventable
- ⬢ Troubleshoot production problems quicker
- ⬢ Use familiar tools instead of scattered scripts





MY GLORIOUS TESTS



ARE ALL GREEN

Uber Fast

Follow Practices

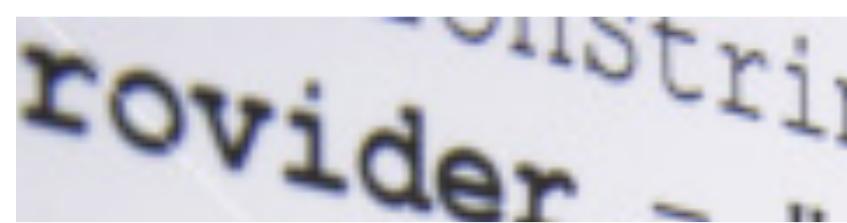
100% Green

100% Coverage

Cured Cancer

*Ended Global
Warming*





Environment

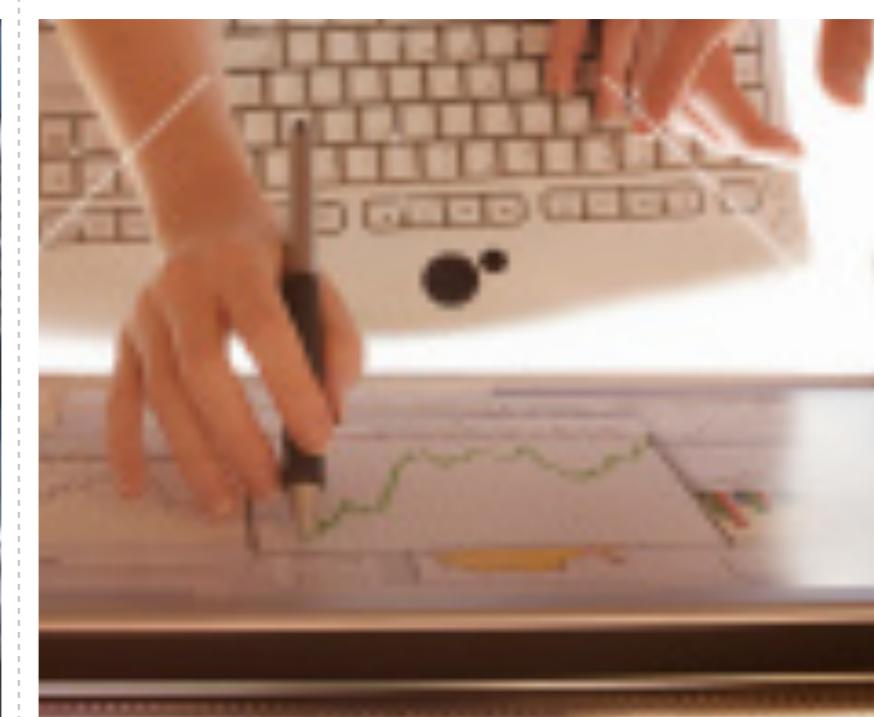
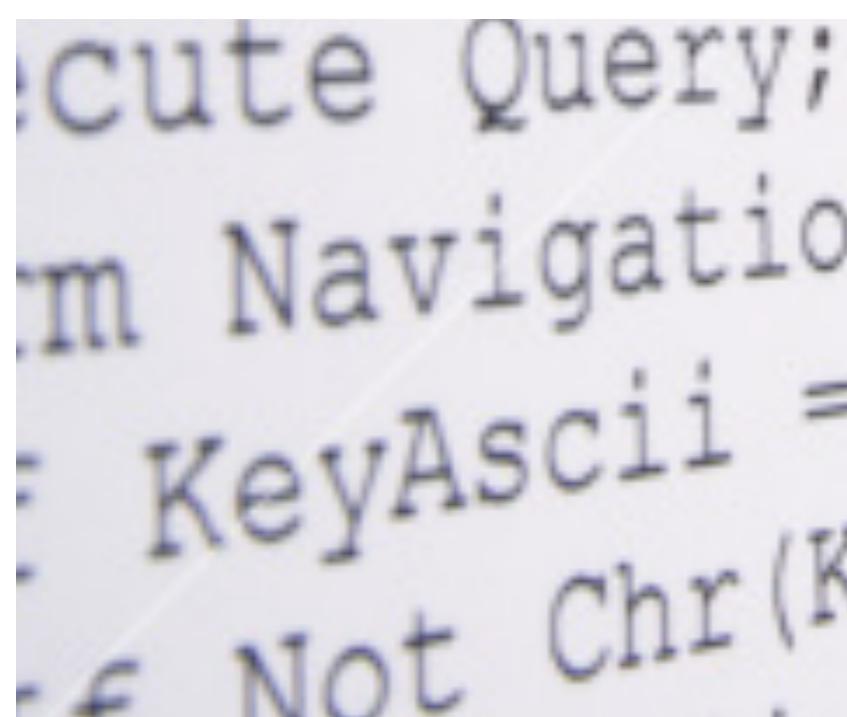
Works on my machine!

Data

Garbage In.
Garbage Out.

Deployment

Command finished successfully.



Environments gone wrong

- ⬢ Different Operating System Behavior - “MBP Bubble”
- ⬢ Missing/Broken Connection Strings - machine.config/database.yml
- ⬢ Missing/Broken Libraries - LibXML / LibXSLT / ImageMagick
- ⬢ Missing/Expired License Keys - DLL Registration
- ⬢ Connectivity Issues / DNS / Config Files
 - ⬢ Local Firewall / DMZ / Internet API Access
- ⬢ Email Delivery - SendGrid Password / Filters
- ⬢ Server Upgrades - Managed Host Security Upgrades



From the trenches...

```
require 'YAML' # yaml.rb
```

```
claco@mbp ~ $ irb
irb(main):001:0> require 'YAML'
=> true
```

```
claco@builds ~ $ irb
irb(main):001:0> require 'YAML'
LoadError: no such file to load -- YAML
  from (irb):1:in `require'
  from (irb):1
```



From the trenches...

```
echo "foop" > my.cfg
```

```
claco@mbp ~ $ python
>>> print open("My.cfg",'r').readlines()
['foop\n']
```

```
claco@builds ~ $ python
>>> print open("My.cfg",'r').readlines()
Traceback (most recent call last):
  File "<stdin>", line 1, in <module>
IOError: [Errno 2] No such file or directory:
'My.cfg'
```



From the trenches...

```
Dir['lib/**/*.rb'].each { |f| require f}
```

```
touch a.rb; touch d.rb  
mkdir b; touch b/c.rb
```

```
claco@mbp ~ $ irb  
irb(main):001:0> Dir['**/*.rb']  
=> ["a.rb", "b/c.rb", "d.rb"]
```

```
claco@builds ~ $ irb  
irb(main):001:0> Dir['**/*.rb']  
=> ["d.rb", "b/c.rb", "a.rb"]
```



From the trenches...

```
modules = map(__import__, os.listdir('.'))
```

```
touch a.py; touch d.py  
mkdir b; touch b/c.py
```

```
claco@mbp ~ $ python  
>>> import os;os.listdir('.')
```

```
[ 'a.py', 'b', 'd.py' ]
```

```
claco@builds ~ $ python  
>>> import os;os.listdir('.')
```

```
[ 'b', 'd.py', 'a.py' ]
```



From the trenches...

uninitialized constant A::BC (NameError)

```
from /usr/local/lib/site_ruby/1.8/rubygems/custom_require.rb:36:in
`gem_original_require'
from /usr/local/lib/site_ruby/1.8/rubygems/custom_require.rb:36:in `require'
from /usr/lib/ruby/gems/1.8/gems/activesupport-2.3.8/lib/active_support.rb:57
from /usr/local/lib/site_ruby/1.8/rubygems/custom_require.rb:36:in
`gem_original_require'
from /usr/local/lib/site_ruby/1.8/rubygems/custom_require.rb:36:in `require'
from /usr/lib/ruby/gems/1.8/gems/rails-2.3.8/lib/rails_generator.rb:31
from /usr/local/lib/site_ruby/1.8/rubygems/custom_require.rb:36:in
`gem_original_require'
from /usr/local/lib/site_ruby/1.8/rubygems/custom_require.rb:36:in `require'
from /usr/lib/ruby/gems/1.8/gems/rails-2.3.8/bin/rails:15
from /usr/bin/rails:19:in `load'
from /usr/bin/rails:19
```



Test your environment!

- ⬢ Run tests on different OS. Maybe two!
- ⬢ Write a test connect to the database / internet
 - ⬢ `rake tests:db:connect`
- ⬢ Write a test to connect to external API
 - ⬢ `rake tests:twitter:connect`
- ⬢ Write a test to confirm emails get delivered
 - ⬢ `rake tests:email:send_confirmation`



Use tests for troubleshooting!

- ☰ Installed a new server. Configured correctly?
 - ☰ Chef/Puppet Recipe downloads/runs tests
- ☰ Installed a new Load Balancer. Still connect to DB?
 - ☰ Run connection tests on all servers
- ☰ Reconfigured Postfix Filters. Mailers still work?
 - ☰ Run mailer tests on app servers
- ☰ God/Relic/Nagios/Client says the site is down!
 - ☰ Run various tests to verify environment / pinpoint issues



Examples in the wild

SQL Server "Denali" CTP1 Setup

Setup Support Rules

Setup Support Rules identify problems that might occur when you install SQL Server Setup support files. Failures must be corrected before Setup can continue.

Setup Support Rules

- Setup Role
- Feature Selection
- Installation Rules
- Disk Space Requirements
- Error Reporting
- Installation Configuration Rules
- Ready to Install
- Installation Progress
- Complete

Operation completed. Passed: 9. Failed 0. Warning 1. Skipped 0.

Hide details << Re-run

[View detailed report](#)

Rule	Status
<input checked="" type="checkbox"/> Fusion Active Template Library (ATL)	Passed
<input checked="" type="checkbox"/> Performance counter registry hive consistency	Passed
<input checked="" type="checkbox"/> Previous releases of SQL Server 2008 Business Intelligence Devel...	Passed
<input checked="" type="checkbox"/> No SxS install with SQL Server "Denali" CTP0	Passed
<input checked="" type="checkbox"/> Consistency validation for SQL Server registry keys	Passed
<input checked="" type="checkbox"/> Computer domain controller	Passed
<input checked="" type="checkbox"/> Microsoft .NET Application Security	Passed



Examples in the wild

Scenario: Checking if apache is running

When I ssh to "localhost" with the following credentials:

username	password
vagrant	vagrant

And I run "ps -ef |grep http|grep -v grep"

Then I should see "http" in the output

Scenario: Surf to apache

Given I go to "http://localhost:9000"

Then I should see "It works"



Examples in the wild

Starting Chef Run for new-server-node

Synchronizing cookbooks

Loading cookbooks [apache, mysql, server-tests]

Processing apache action install

Processing mysql action install

Processing server-tests action execute

```
$ knife ssh "node:app01" "sudo server-tests"
```



Data gone wrong

- ⬢ Legacy Business System -> New Shiny WebApp
- ⬢ Little / No / Different Constraints
- ⬢ Bad data import into “good” schema or strict constraints
- ⬢ Table of file names. Do they exist?
- ⬢ “Required” fields which are still NULL / invalid format (Email)
- ⬢ Complex Data Logic (When Does Widget X Deliver?)
- ⬢ Inventory + Qty + Date + Time + Weight + Zip + POM == Est. Delivery Date



From the trenches...

```
CREATE TABLE Legacy_DB_Widgets
(
    Id int NOT NULL,
    Name varchar(255) NOT NULL
)
```

```
CREATE TABLE Greenfield_Widgets_View
(
    Id int NOT NULL,
    Name varchar(255) NOT NULL,
    UNIQUE (Name)
)
```

```
SELECT ...
INTO Greenfield_Widgets_View
FROM Legacy_DB_Widgets
INNER JOIN (...5 other tables!)
```

Duplicate entry 'WidgetName' for key 4



From the trenches...

Error 0xc0047038: Data Flow Task: SSIS Error Code DTS_E_PRIMEOUTPUTFAILED. The PrimeOutput method on component "Source 2 - name\$" (128) returned error code 0xC02020C4. The component returned a failure code when the pipeline engine called PrimeOutput(). The meaning of the failure code is defined by the component, but the error is fatal and the pipeline stopped executing. There may be error messages posted before this with more information about the failure.
(SQL Server Import and Export Wizard)



From the trenches...

```
CREATE TABLE Attachments  
(  
    Id int NOT NULL,  
    User int NOT NULL,  
    FileName varchar(255) NOT NULL  
)
```

Id	User	FileName
1	1	derp-resume.pdf

<http://example.com/users/derp/attachments/1>

RESOURCE NOT FOUND



From the trenches...

```
user = User.new( :email => 'bogons' )
-> ArgumentError "Email address is crap!"
```

```
def register
  user = User.new( :email => valid_form_data.email )
  user.save
end

def login
  if legacy.authenticate(user, pass)
    user = User.new( :email => legacy.email ) # "bogons"
  end
end
```

“Customer Derp called. They can’t login! Help!”



Test your data!

- ➊ Write a test to detect duplicate data
 - ⬢ `rake tests:widgets:dups`
- ➋ Write a test to detect invalid data
 - ⬢ `rake tests:emails:format`
- ➌ Write a test to detect if files exist
 - ⬢ `rake tests:attachments:exist`
- ➍ Write a test to analyze data against logic
 - ⬢ `rake tests:delivery:estimate widget=ABC1234`



Use tests for troubleshooting!

- ⬢ Complex Import failed? Run the data tests.
- ⬢ Image is missing! Run the file tests.
- ⬢ Why doesn't X page show Y?. Run the logic tests.
- ⬢ Run various tests to verify environment.
- ⬢ Quick identification of problems.



Deployment gone wrong

- ⬢ Tests Passed on the Build Server. So what?
- ⬢ Deploy Without Errors. Does the site work?
- ⬢ Tests confirm functionality
 - ⬢ ...for Stakeholders...not Users
 - ⬢ Not usually reusable
- ⬢ QA can't possibly test 100% on every release
- ⬢ Customers are the first to find issues



From The Trenches...

```
yum install imagemagick
```

```
bundle install --deployment
```

```
claco@builds ~ $ bundle exec rails console  
irb(main):001:0> require 'rmagick'  
LoadError: ImageMagick 6.0.so not found....
```

```
echo "/usr/lib" >> /etc/ld.so.conf.d/local.conf  
ldconfig
```



Examples in the wild

```
$ cpan install App::Ack
```

```
Running make test  
t/ack-binary.t ..... ok  
t/ack-ignore-dir.t ..... ok
```

```
...  
All tests successful.
```

```
Running make install  
Installing /usr/local/bin/ack
```



Examples in the wild

Perl Version	Windows (Cygwin)	Mac OS X	Dragonfly BSD	FreeBSD	IRIX	GNU/Linux	MirOS BSD	Windows (Win32)	NetBSD	OpenBSD	SunOS/Solaris
5.17.2										1.00014	
5.17.1										1.00014	1.00
5.17.0						1.00014				1.00014	
5.16.2						1.00014		1.00014	1.00014	1.00014	
5.16.1						1.00014	0.33	1.00014		0.33	1.00



Examples in the wild

```
$ cap deploy
```

- * executing `deploy'
- * executing `deploy:tests:environment'
- * executing `deploy:update_code'
- * executing `deploy:tests:specs'
- * executing `deploy:symlink'



Test Everything!

- ⬢ Find a bug in code? Write a test.
- ⬢ Find a bug in the deploy process? Write a test.
- ⬢ Find a bug in the environment? Write a test.
- ⬢ Find a bug in external data? Write a test.
- ⬢ Researched same problem multiple times? Write a test. Pass it on.
- ⬢ Tests are your todo list of things that can go wrong.
- ⬢ Tests are your troubleshooting checklist when things go wrong.
- ⬢ Tests make troubleshooting quicker and more accessible.



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